CLEC	Financing/Partnering	Company Provides Own Facilities			
		Switch	Loop	Transport	Other
	Lucent to provide $250 M in equipment financing for market build-out; KMC also plans $65 M private placement of preferred stock (2/04/99)				
KMC Telecom Corp. (cont.)		**X**	**X**	**X**	
	Announces an increase in financing from $70 M to $250 M that includes a $175 M, 8-year revolving line and a $75 M loan carrying an 8 ½ year term with several underwriters to fund additional telecommunications equipment (1/13/99)				
Level 3		**X**		**X**	
	Focal announces agreement with Level 3 to get capacity on Level 3's facilities in seven markets (5/10/99)				
	MetroMedia announces agreement to supply Level 3 with local network capacity in NY city and Washington areas (4/14/99)				
	GST and Level 3 announce agreement to build a long-haul network segment linking San Diego to GST's existing fiber-optic backbone (3/30/99)				
	GST announces plans with NEXTLINK and Level 3 to construct a San Diego-area fiber-optic network (3/22/99)				

CLEC	Financing/Partnering	Company Provides Own Facilities			
		Switch	Loop	Transport	Other
	Level 3 and RCN announce plans to pool resources on network construction projects in Manhattan and Boston (2/16/99)				
	RCN announces it has acquired capacity along Level 3's cross-country fiber internet backbone (1/12/99)				
Logix		**X**	**X**		
	Closed on a $75 M revolving credit with several banks to be used to finance DSL deployments (4/20/99)				
MCI WorldCom		**X**	**X**	**X**	**SS7/OS/DA**
	KMC announces five-year deal ro provide MCI WorldCom with dedicated local-access services in 18 markets (5/05/99)				
	Rhythms announces $30 M investment/alliance with MCI WorldCom that gives MCI WorldCom access to Rhythms' DSL services (1/26/99)				
McLeodUSA		**X**	**X**	**X**	
	Announces pricing of secondary offering of 9 M shares with several underwriters (5/13/99)				
	Announces DSL data network upgrades and network expansion efforts in KS, ID, MT, NE and UT (4/15/99)				
	Announces completion of merger with Ovation Communications (4/01/99)				

CLEC	Financing/Partnering	Company Provides Own Facilities			
		Switch	**Loop**	**Transport**	**Other**
	Announces plans to sell $500 M of senior notes with a private placement offering (2/12/99)				
MediaOne		**X**	**X**	**X**	
	AT&T announces $58 B rival bid for MediaOne (4/22/99)				
MetroMedia Fiber Networks				**X**	
	Allegiance announces agreement with dark-fiber firm MetroMedia Fiber Networks that connects 14 COs in Dallas area (4/19/99)				
	MetroMedia announces agreement to supply Level 3 with local network capacity in NY city and Washington areas (4/14/99)				
	Announces two-for-one stock split of class A & class B shares (4/13/99)				
	MetroMedia Fiber Networks announces 20-year agreement to lease fiber-optic capacity in NY and NJ to Time Warner Telecom who plans to offer local, LD and internet services (3/09/99)				
	MetroMedia Fiber Networks announces joint-marketing pact with Cisco Systems to offer IP-based products and services (3/02/99)				

CLEC	Financing/Partnering	Company Provides Own Facilities			
		Switch	**Loop**	**Transport**	**Other**
	Hyperion announces agreements with five companies, including e.spire and MetroMedia Fiber Networks, allowing it to use existing fiber-optic facilities (2/09/99)				
	Announces agreement to lease network capacity in Washington D.C. area to AOL in a multi-year deal (2/02/99)				
MetroMedia Fiber Networks (cont.)				**X**	
	Metromedia announces $44 M agreements which provide Intermedia with access to Metromedia network facilities in San Francisco and the Silicon Valley and provide Hyperion with dark-fiber capacity along Metromedia's systems in New York, Chicago and Washington, D.C. (1/12/99)				
MGC Communications		**X**			
	Announces plans for secondary public offering of common stock for introduction of new services (5/14/99)				
	Closed on $47.5 M stock purchase to be used for DSL strategy and network expansion (5/05/99)				

CLEC	Financing/Partnering	Company Provides Own Facilities			
		Switch	Loop	Transport	Other
	Furman Selz analyst raises year-end price target for MGC from $27 to $90 based on MGC's newly announced DSL initiative (4/08/99)				
NEXTLINK		**X**	**X**	**X**	
	Filed papers for $750 M of senior notes with several underwriters to be used for network buildouts (5/06/99)				
	Closed on $695 M buy of wireless firm WNP Communications (4/28/99)				
NEXTLINK (cont.)		**X**	**X**	**X**	
	GST announces plans with NEXTLINK and Level 3 to construct a San Diego-area fiber-optic network (3/22/99)				
	Lehman Bros. initiates coverage with "buy" rating (2/19/99)				
	Announces agreement to buy wireless license holder WNP Communications for about $542 M; also plans to buy partner Nextel Communications' 50% stake in NEXTBAND for$138 M; this will make NEXTLINK the top holder of LMDS spectrum in North America and will be used to accelerate deployment of local services nationwide (1/14/99)				

CLEC	Financing/Partnering	Company Provides Own Facilities			
		Switch	**Loop**	**Transport**	**Other**
	Covad announces $20 M strategic relationship/equity investment with NEXTLINK; also NEXTLINK will resell Covad's DSL services and will serve as Covad's preferred provider of local transport facilities and collocation services (1/05/99)				
NorthPoint					**DSL**
	IPO today of 15 M shares/several underwriters (5/05/99)	NorthPoint provides DSL services.			
	Intermedia announces alliances with Rhythms and NorthPoint to expand DSL throughout much of country (4/29/99)				
NorthPoint (cont.)					**DSL**
	$20 M investment/alliance with Tandy Corporation (4/27/99)	NorthPoint provides DSL services.			
	Microsoft announces plans to invest $30 M in NorthPoint (4/19/99)				
	ICG announces two-year agreement with NorthPoint and will invest $10 M in NorthPoint (4/15/99)				
	Announce agreement that gives Frontier the ability to market DSL services in several markets and provides NorthPoint with access to a national fiber-optic backbone; also includes a $4.9 M investment in NorthPoint by Frontier (4/07/99)				

CLEC	Financing/Partnering	Company Provides Own Facilities			
		Switch	**Loop**	**Transport**	**Other**
	Hertz Technology announces partnership with NothPoint (3/31/99)				
	SAVVIS Communications announces agreement with NorthPoint to offer DSL services in 12 major markets now and 10 more cities by the end of the year aimed at small and mid-sized businesses (3/15/99)				
	Announces IPO filing to raise $125 M for deployment of DSL systems in some 28 markets by end of year with several underwriters (3/01/99)				
NorthPoint (cont.)					**DSL**
	Announce two-year agreement allowing ICG to expand its DSL footprint and designates NorthPoint as ICG's preferred DSL provider (2/18/99)	NorthPoint provides DSL services.			
	Announces agreement with Verio Inc. to begin offering Verio's high-speed internet access services; Verio has invested $5.6 M in NorthPoint (2/08/99)				
Pac-West Telecom		**X**			
	Announces plans to finance expansion through sale of $150 M of 10-year bonds (2/02/99)				
PaeTec		**X**		**X**	

CLEC	Financing/Partnering	Company Provides Own Facilities			
		Switch	Loop	Transport	Other
	Announces 5-year $100 M equipment agreement with Lucent (1/14/99)				
Qwest				X	
	Qwest announces a 7-year $63 M agreement with Advanced TelCom Group to provide internet connectivity, frame relay and long distance services (4/26/99)				
Qwest (cont.)				X	
	BellSouth announces agreement to spend $3.5 B for a 10% stake in IP telephony firm Qwest Communications; companies plan to jointly market data and voice services (4/19/99)				
	Rhythms announces $15 M strategic relationship/equity investment with Qwest (4/07/99)				
	Covad announces plans to offer long-distance DSL using Qwest's and AT&T's ATM backbones (3/29/99)				
	Announces completion of the purchase of Karlsruhe, Germany-based Xlink Internet Service GmbH for approximately $12.7 M (2/08/99)				

CLEC	Financing/Partnering	Company Provides Own Facilities			
		Switch	Loop	Transport	Other
	Covad announces a $15 M strategic relationship/equity investment with Qwest; also Qwest will resell Covad's DSL services and allow Covad to route network traffic along Qwest's nationwide IP system (1/19/99)				
RCN		**X**	**X**	**X**	
	Started public offering of 8 M shares of common stock with several underwriters (5/10/99)				
	$1 B credit line arranged by Chase Manhattan and $250 M investment from Hicks, Muse, Tate & Furst, Inc. (3/18/99)				
RCN (cont.)		**X**	**X**	**X**	
	Level 3 and RCN announce plans to pool resources on network construction projects in Manhattan and Boston (2/16/99)				
	RCN announces it has acquired capacity along Level 3's cross-country fiber internet backbone (1/12/99)				
Rhythms					**DSL**
	Announces agreement to provide DSL data connectivity to joint-venture partners VPN Communications and EMB Corp. (5/19/99)	Rhythms provides DSL services.			

CLEC	Financing/Partnering	Company Provides Own Facilities			
		Switch	**Loop**	**Transport**	**Other**
	Announces IPO raised $527 M for network expansion (5/11/99)				
	Intermedia announces alliances with Rhythms and NorthPoint to expand DSL throughout much of country (4/28/99)				
	Announces note offering announced last week has been increased from $200 M to $325 M (4/19/99)				
	Announces a $200 M private offering of senior notes to be used for network expansion (4/15/99)				
	Salomon Smith Barney has begun tracking Rhythms, which went public this week, with a "buy" rating (4/08/99)				
Rhythms (cont.)					**DSL**
	IPO today of 9.375 M shares/several underwriters (4/07/99)	Rhythms provides DSL services.			
	Rhythms announces $15 M strategic relationship/equity investment with Qwest (4/07/99)				
	$30 M investment/alliance with Microsoft (3/19/99)				
	Rhythms announces $30 M investment/alliance with MCI WorldCom that gives MCI WorldCom access to Rhythms' DSL services (1/26/99)				
TelePacific		**X**			

CLEC	Financing/Partnering	Company Provides Own Facilities			
		Switch	Loop	Transport	Other
	TelePacific announces agreement with Covad to offer DSL services to business customers in CA and NV (5/11/99)				
	Announces it has secured a $15 M investment from a private equity fund to support telephony and internet expansion in CA and NV (4/19/99)				
Teligent		**X**	**X**	**X**	**OS/DA**
	Lehman Bros. initiates coverage with "buy" rating (2/19/99)				
	Announces agreement with Arden Realty giving Teligent access to more than 200 commercial properties in southern CA (1/26/99)				
Teligent (cont.)		**X**	**X**	**X**	**OS/DA**
	Spieker Properties announces west coast agreement with Advanced Radio Telecom, Teligent and WinStar Communications giving the carriers access to more than 5,000 tenants in Spieker buildings (1/14/99)				
Time Warner Telecom		**X**	**X**	**X**	
	Pending IPO of 18 M shares (5/12/99)				

CLEC	Financing/Partnering	Company Provides Own Facilities			
		Switch	Loop	Transport	Other
	Announces creation of internet and data division with planned acquisition of ISP Internet Connect; have plans have own national IP backbone and to launch DSL services in a host of markets (4/20/99)				
	MetroMedia Fiber Networks announces 20-year agreement to lease fiber-optic capacity in NY and NJ to Time Warner Telecom who plans to offer local, LD and internet services (3/09/99)				
Touch America			**X**	**X**	
	Announce agreement which lets Touch America offer private line services on Electric Lightwave's network and gives Electric Lightwave access to Touch America's systems in four states (3/30/99)				
US LEC		**X**			**SS7**
	Salomon Smith Barney has begun tracking US LEC with a "trading buy" rating (4/08/99)				
	Announces completion of $50 M revolving credit to pay for continued deployment of its network facilities (1/05/99)				

CLEC	Financing/Partnering	Company Provides Own Facilities			
		Switch	Loop	Transport	Other
Williams Communications				X	
	GST and partner Pacific Fiber Link have added new partner, Williams Communications, to their 715-mile fiber-optic project linking Sacramento and Portland; Williams will pay $47.2 M and will get access to network facilities along the system (1/12/99)				
WinStar Communications		X	X	X	
	Announces agreement with Great Lakes REIT to deploy network at 11 Great Lakes properties with option to install at another 20 properties during the next 3 years (5/10/99)				
	Announces expanded relationship with Lucent; WinStar will serve as value-added reseller for Lucent; in October 1998, WinStar signed a 5-year equipment financing deal with Lucent valued at up to $2 B (4/26/99)				
WinStar Communications (cont.)		X	X	X	
	Announces agreement to install its network systems at some 90 office buildings managed by Equity Office Properties Trust (4/06/99)				

CLEC	Financing/Partnering	Company Provides Own Facilities			
		Switch	Loop	Transport	Other
	Lehman Bros. initiates coverage with "buy" rating (2/19/99)				
	Announces $4.2 M common stock offering with several underwriters to pay for continued growth both in the US and in foreign markets (2/04/99)				
	J.P. Morgan initiates coverage with "buy" rating and 12-month target of $60 per share (1/20/99)				
	Spieker Properties announces west coast agreement with Advanced Radio Telecom, Teligent and WinStar Communications giving the carriers access to more than 5,000 tenants in Spieker buildings (1/14/99)				

AT&T's Responses to GTE's Third Set of Data Requests
Missouri Docket No. TO-98-329
Request No. 102
11/23/98

Request No. 102

AT&T produced redacted documents in response to Data Request No. 1 ("the Fassett documents"). AT&T has produced Fassett documents with no redactions or fewer redactions in other proceedings (e.g., New Mexico and Washington). Will AT&T agree to produce those documents in this docket?

Response:

Attached are the Fassett documents produced by AT&T in Washington.

Responsible Person: Thomas C. Madden
Manager - Access Local Services Division
AT&T
131 Morristown Road
Basking Ridge, N.J. 07920

IDLC Unbundling

This objective of this paper is to describe several practical alternatives for unbundling local loops served by Integrated Digital Loop Carrier (IDLC).

Background

To provide an understanding of the issues involved and the importance of employing a forward-looking digital interface between the IDLC remote terminal and the Competitive Local Exchange Carrier (CLEC) switch, the following section reviews basic ways to interface a digital loop carrier with a local switch.

Universal Analog Interface (UDLC TR-057):

In the analog switching environment, it was necessary to interface Digital Loop Carriers (DLCs) with a central office switch on a voice frequency, or analog basis. The DLC for this environment was deployed in a Universal Digital Loop Carrier (UDLC) configuration, and the functional and technical specifications covering this configuration are contained in Bellcore Technical Reference TR-057. This configuration (Figure 1) consisted of a Remote Digital Terminal (RDT), a Central Office Terminal (COT), and a digital transmission facility linking the RDT and the COT. Channel units in the RDT provided Analog to Digital (A/D) conversion between the DLC and the voice frequency twisted pair loop to the customer, and channel units in the COT provided the A/D conversion to interface the DLC with the local analog switch.

With the advent of digital local central office switches, this configuration necessitated analog line units in the switch, to provide A/D conversion for interfaces with the UDLC, on an analog basis. Utilizing the UDLC configuration in a digital switch environment results in back-to-back A/D conversion at the digital switch location. This degrades transmission quality, increases the probability of more troubles associated with the line because of additional equipment, and it costs more.

Integrated Interface (TR-008/GR-303):

An integrated interface was developed for connecting digital loop carriers to digital local switches. In an IDLC configuration (Figure 1), the Digital Loop Carrier is integrated directly into the Local Digital Switch (LDS). This configuration consists of a Remote Digital Terminal (RDT) and an Integrated Digital Terminal (IDT) which is part of the switch. The major benefit of an IDLC configuration is that the DLC and LDS interface on a digital basis, avoiding the transmission degradation caused by the A/D conversion in the COT and the switch line units. Substantial cost reductions and service improvements are also achieved by the elimination of the COT, MDF, and switch line units.

There are two technical standards for interfacing digital loop carriers and digital switches. The first, and original one was TR-008, based on the AT&T SLC-96 IDLC. The second, and the forward-looking one is GR-303.

TR-008 Interface:

The TR-008 interface (Figure 3) can be configured in Mode 1 or Mode 2.

TR-008 Mode 1 is a non-concentrated interface that consists of 4 DS1s , or 5 DS1s if protection is provided. The DS1s are designated as the A, B, C and D digroups (the protection digroup , if provided, is designated as the P digroup). The 'A' digroup contains a datalink used for MLT testing, alarms and protection switching (if protection is provided).

TR-008 Mode 2 is a concentrated interface with 2:1 concentration. It consists of 2 DS1s, or 3 if protection is provided. The DS0s for the 'A' and 'B' digroups are concentrated into the 'A' digroup, and DS0s for the 'C' and 'D' digroups are concentrated into the C digroup. In Mode 2, the datalink in the 'A' digroup also contains the concentration channel assignment for the 'A' digroup, and a separate datalink is contained in the 'C' digroup for channel assignment for the 'C' digroup.

The functionality of a TR-008 interface is limited to locally switched "POTS like" services, which means that it cannot support ISDN, nor non-switched and non-locally switched special services.

GR-303 Interface:

Digital loop carrier, and local digital central office switches that are compatible with Generic Requirements GR-303, are forward-looking technologies that support digital services, such as ISDN, and provide for optimizing the utilization of switching and DLC channel capacity based on the traffic volumes. The GR-303 interface provides for variable concentration, consisting of a minimum of 2 DS1s, and a maximum of 28 DS1s. The first DS1 in the GR-303 interface contains an Embedded Operations Channel (EOC), and a Timeslot Management Channel (TMC). Standby backups for each are contained in the second DS1 to provide for redundancy between the RDT and the local digital switch IDT. Because GR-303 provides for variable concentration and bandwidth assignment, it requires the TMC to assign timeslots for DS0s and the ISDN B-Channels. The EOC provides a communications path for alarms and MLT testing. The concentration ratio is determined by the number of DS1s provisioned, based on traffic requirements for the customers served by the GR-303 interface group (IG), using similar traffic parameters and methodology used to design switch capacity.

The Hatfield model is based on forward-looking technology, using next generation IDLC and LDS technologies, based on the generic requirements of GR-303.

Unbundling

The following provides three alternative configurations for unbundling local loops involving Integrated Digital Loop Carrier (IDLC).

1. Multi GR-303 Interface Group (IG):

This configuration is shown in Figure 4.

The RDT (Remote Digital Terminal) of a NGDLC supports multiple GR-303 interfaces. Release 8.1 for the Litespan 2000 RDT will support 4 interface groups and it's anticipated that this will increase to as many as 8 in the near future. This RDT feature of supporting multiple GR-303 IGs provides the opportunity for multiple CLECs to establish an GR-303 IG with a capacity of from 2 to 28 DS1s between their LDS and the RDT.

In this configuration, the local loop can be unbundled at the DS0 level by employing the TSI in the RDT to cross connect (map) the CLEC customers to the CLEC GR-303 IG within the RDT. This can be accomplished remotely using the NGDLC Operating, Maintenance, Administration, and Provisioning Support system (OMAPS in the case of Litespan 2000).

This configuration provides the same high quality transmission for all CLEC and ILEC customers served by the RDT.

2. Digital Cross Connect:

Figure 5 shows a configuration for GR-303 unbundling, by utilizing the RDT to cross connect CLEC customer DS0s into DS1s terminated into a Digital Cross Connect System (DCS). The DCS is utilized to cross connect individual CLEC DS0s from all RDTs terminated on the DCS, to a port for transport to the CLEC LDS. This architecture is most applicable where there are a large number of CLECs, each requiring very few circuits on a GR-303 RDT. Disadvantages of this configuration include an analog interface into the CLEC switch, and special services design and testing procedures.

This configuration can also be used for unbundling TR-008 IDLCs.

3. Side-Door Port:

Figure 6 shows the GR-303 switch feature called the side-door-port configuration. This feature operates like a Digital Cross Connect System (DCS), and provides for the capability to groom DS0s from several RDTs. Similar to the Digital Cross Connect System option, the disadvantages of this configuration include an analog interface into the CLEC switch, and special services design and testing procedures.

4. TR-008 Interface:

Similar to the configuration shown in Figure 4 for GR-303, a CLEC can establish a TR-008 interface group between its digital switch and the RDT. As the capacity of each TR-008 interface group is 96 lines, the number of TR-008 interface groups that a RDT can support is based on its

capacity divided by 96. For example a RDT with capacity of 672 lines can support seven TR-008 interface groups.

Figure 5 shows an alternative configuration for unbundling TR-008 IDLCs using a TR-008 compliant Digital Cross Connect System (DCS) to allow multiple CLECs to interconnect with integrated RDTs. The benefits of this configuration include, special service grooming, higher utilization and digital test access. It also avoids the analog-to-digital conversion involved in the above digital cross connect and side-door-port options.

Since many GR-303 compliant digital loop carriers support TR-008 interfaces, these two TR-008 unbundling options are also applicable for GR-303 Integrated DLCs.

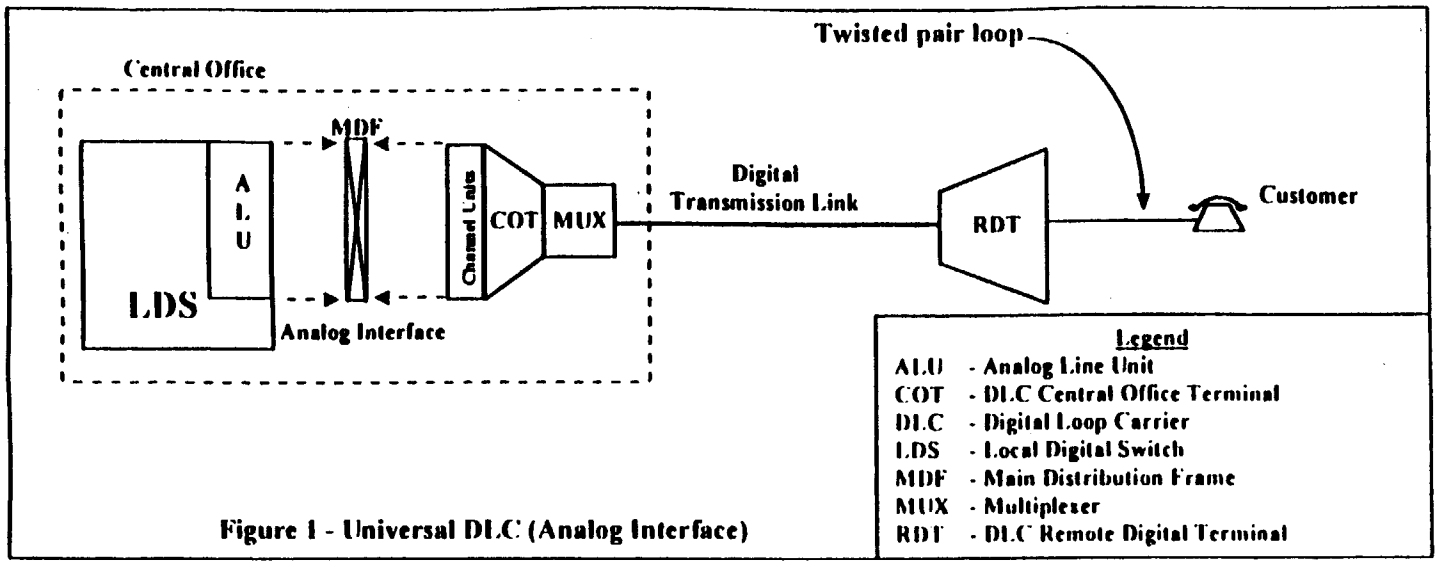


Figure 1 - Universal DLC (Analog Interface)

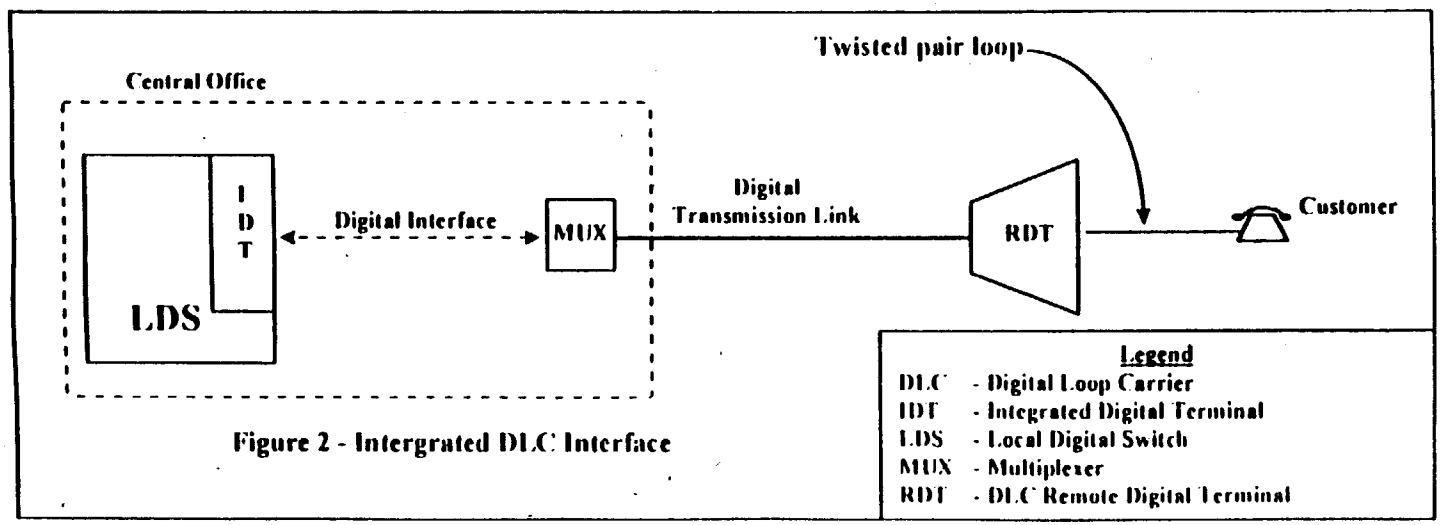
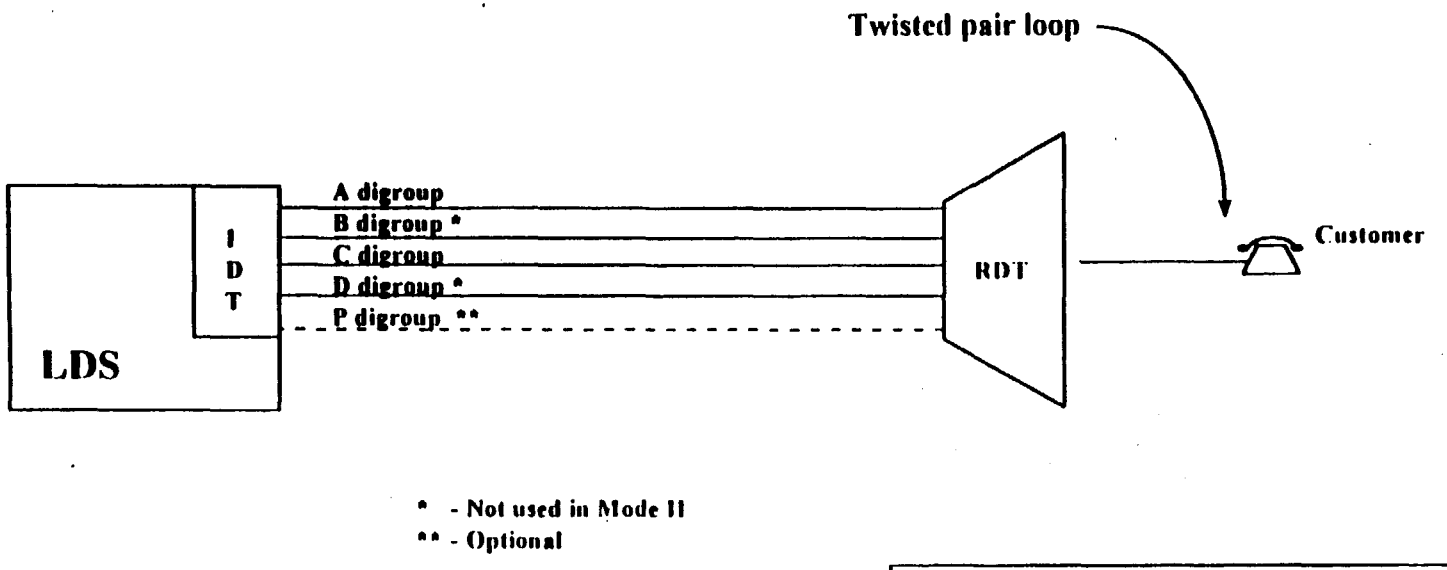


Figure 2 - Intergrated DLC Interface

TR-008 INTEGRATED INTERFACE



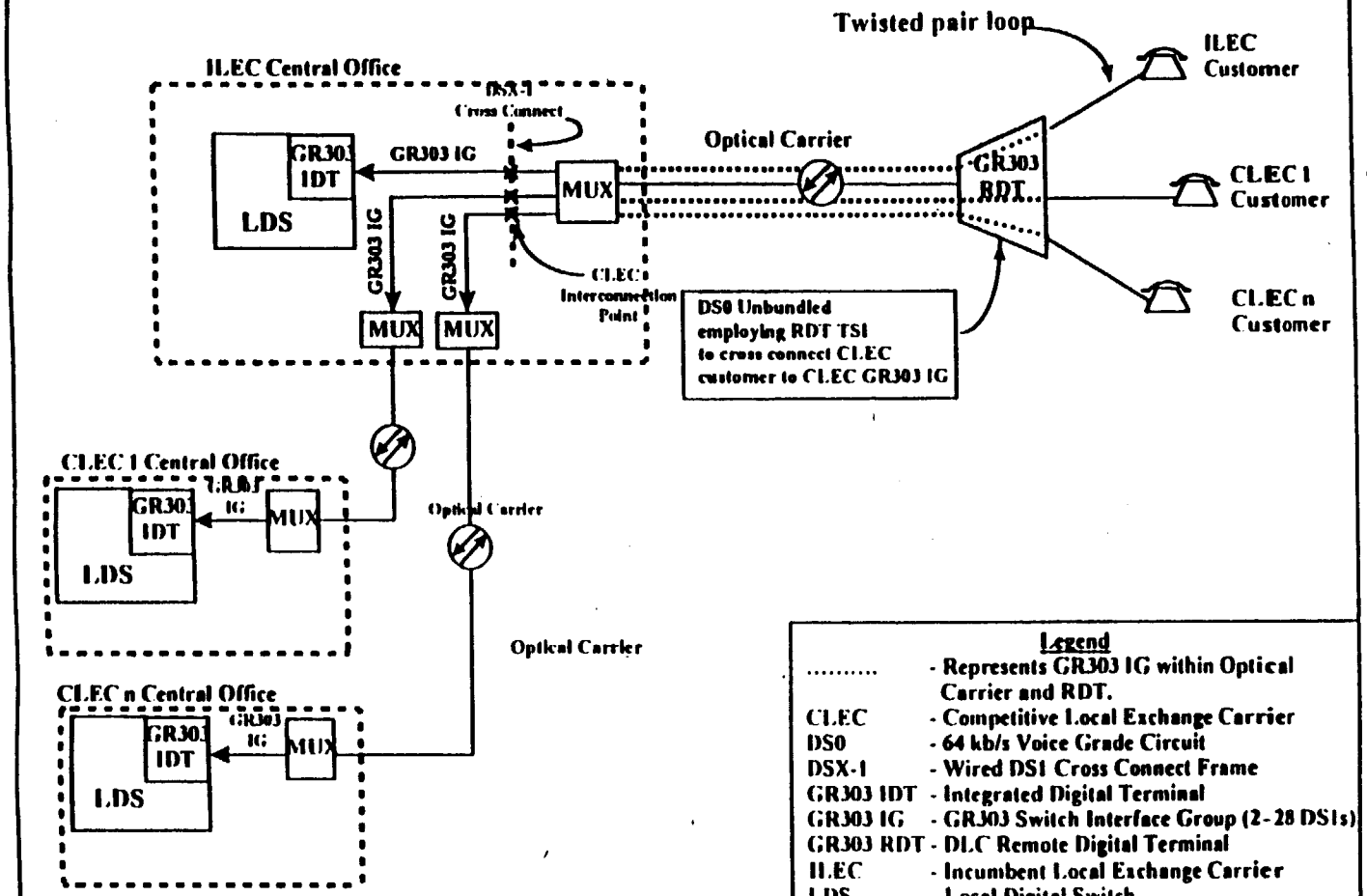
* - Not used in Mode II
** - Optional

Legend

IDLC - Integrated Digital Loop Carrier
IDT - Integrated Digital Terminal
LDS - Local Digital Switch
RDT - DLC Remote Digital Terminal

Figure 3. TR-008 IDLC Interface

UNBUNDLING USING MULTIPLE GR-303 INTERFACE GROUP



Legend

.....	- Represents GR303 IG within Optical Carrier and RDT.
CLEC	- Competitive Local Exchange Carrier
DS0	- 64 kb/s Voice Grade Circuit
DSX-1	- Wired DS1 Cross Connect Frame
GR303 IDT	- Integrated Digital Terminal
GR303 IG	- GR303 Switch Interface Group (2-28 DS1s)
GR303 RDT	- DLC Remote Digital Terminal
ILEC	- Incumbent Local Exchange Carrier
LDS	- Local Digital Switch
MUX	- Multiplexer
TSI	- Time Slot Interchanger

Figure 4 - Multiple GR-303 Interface Groups

UNBUNDLING USING A DIGITAL CROSS CONNECT

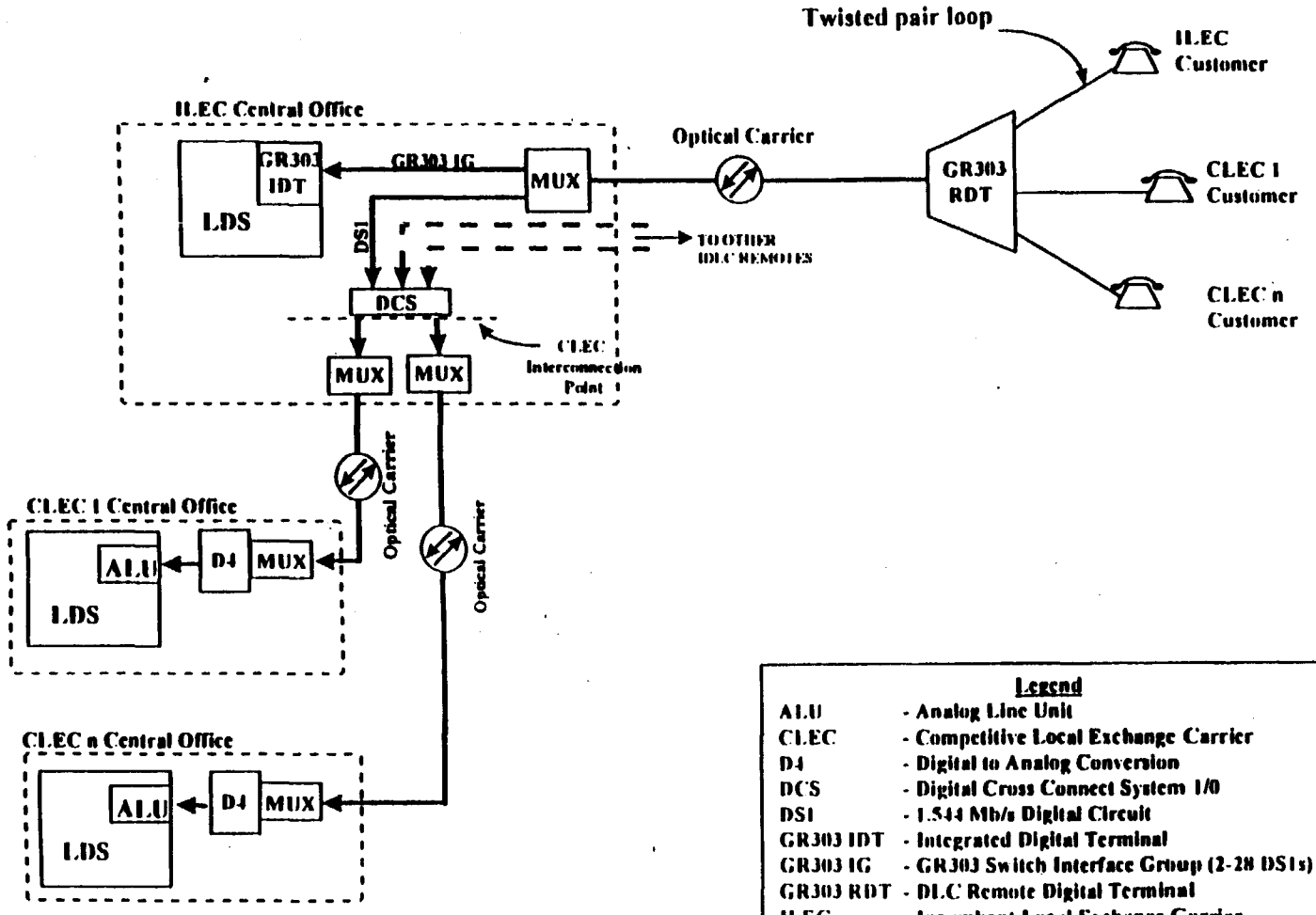


Figure 5 - Digital Cross Connect

Legend

ALU	- Analog Line Unit
CLEC	- Competitive Local Exchange Carrier
D4	- Digital to Analog Conversion
DCS	- Digital Cross Connect System I/O
DS1	- 1.544 Mb/s Digital Circuit
GR303 IDT	- Integrated Digital Terminal
GR303 IG	- GR303 Switch Interface Group (2-28 DS1s)
GR303 RDT	- DLC Remote Digital Terminal
ILEC	- Incumbent Local Exchange Carrier
LDS	- Local Digital Switch
MUX	- Multiplexer

UNBUNDLING USING THE SIDE-DOOR PORT

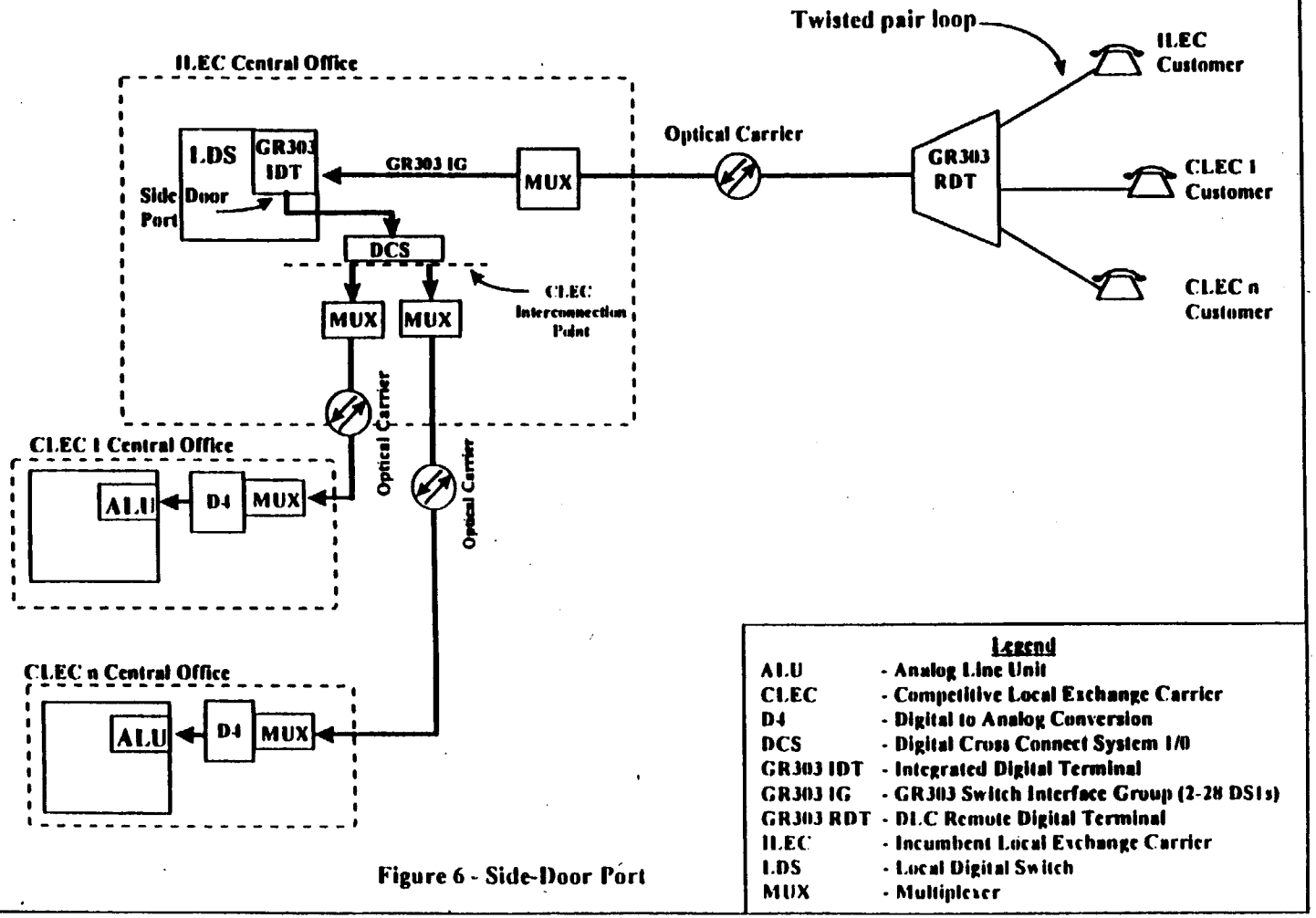


Figure 6 - Side-Door Port

Legend

ALU	- Analog Line Unit
CLEC	- Competitive Local Exchange Carrier
D4	- Digital to Analog Conversion
DCS	- Digital Cross Connect System I/O
GR303 IDT	- Integrated Digital Terminal
GR303 IG	- GR303 Switch Interface Group (2-28 DS1s)
GR303 RDT	- DLC Remote Digital Terminal
ILEC	- Incumbent Local Exchange Carrier
LDS	- Local Digital Switch
MUX	- Multiplexer

UNBUNDLING USING A DIGITAL CROSS CONNECT AND TR-008 INTERFACE

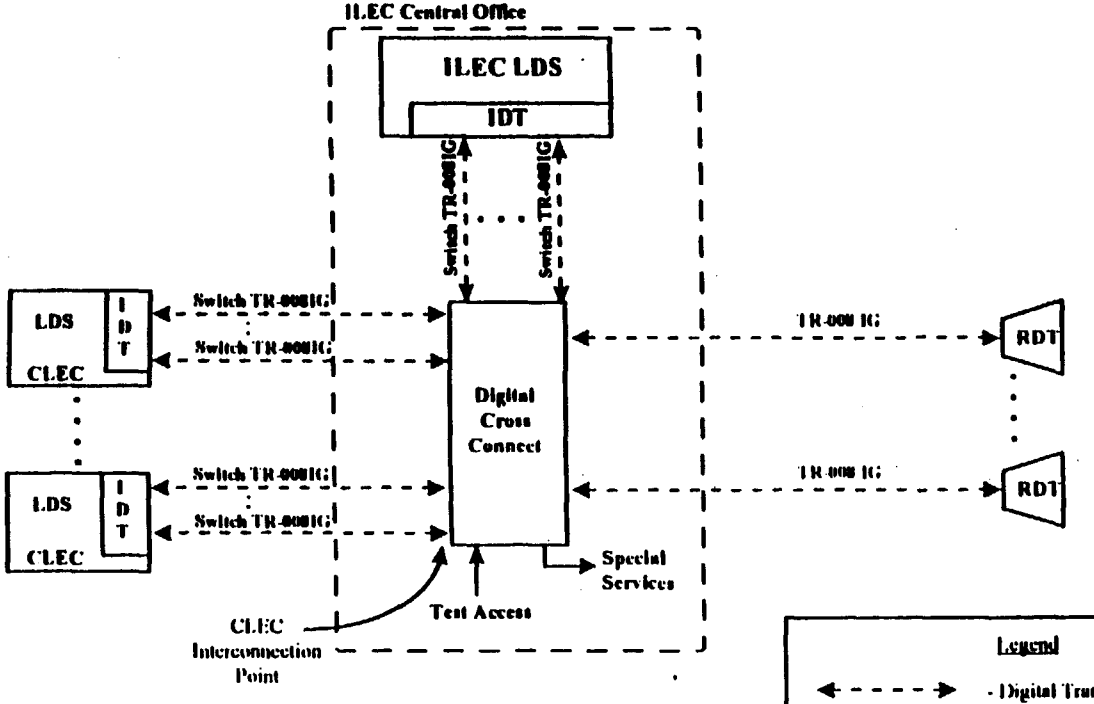


Figure 7 - Digital Cross Connect and TR-008 Interface

Legend

◄- - - - -►	- Digital Transmission Link
TR-008 IG	- TR-008 Interface Group (4 DS1s)
Switch TR-008 IG	- Switch TR-008 Interface Group (4 DS1s)
RDT	- Remote Digital Terminal
CLEC	- Competitive Local Exchange Carrier
ILEC	- Incumbent Local Exchange Carrier
IDT	- Integrated Digital Terminal
LDS	- Local Digital Switch